

What is the best

"Imaging Method for TOF Detectors"

- High Speed Signal Accumulation and Readout for an Imaging Plate -

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OUR PROPOSAL

**"High speed signal accumulation and readout
for a neutron imaging plate"**

Why do we propose the integration method using
an imaging plate?:

1. Independence of neutron incident rate
2. Good position discrimination, wide dynamic range, good neutron sensitivity and large detection area

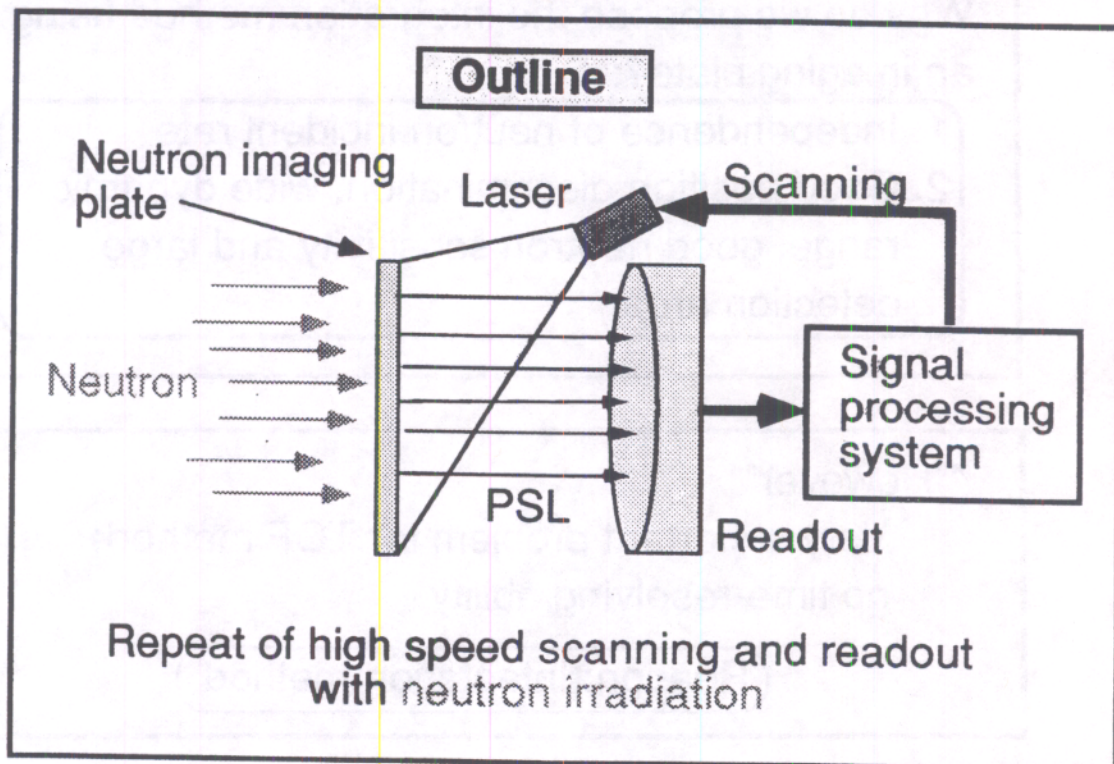
""However""

Very important problem for TOF method:
no time-resolving ability

Reason: Integration method

How to solve the time-resolving problem

High speed signal accumulation and readout
for a neutron imaging plate



High speed scanning and readout method for an imaging plate

Parallel read out



Irradiation of excitation light
with a rectangular shape

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Usage of wavelength shifter fiber
as a position detector

Multichannel light signal detections and signal processing

Normal method

Modules increase with increase of
a position resolution and a detection area

How to solve for parallel readout of imaging plate



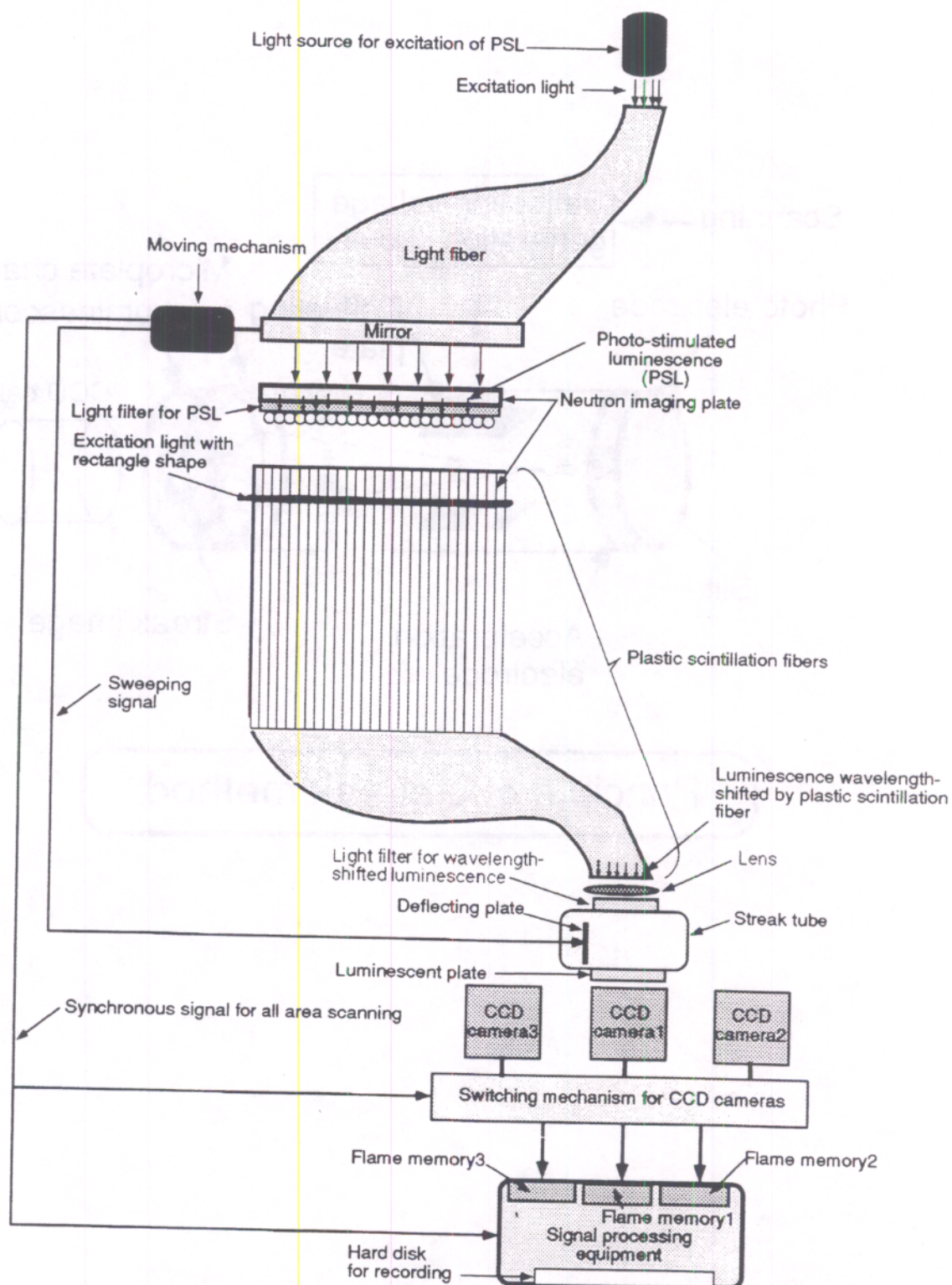
Streak method

+

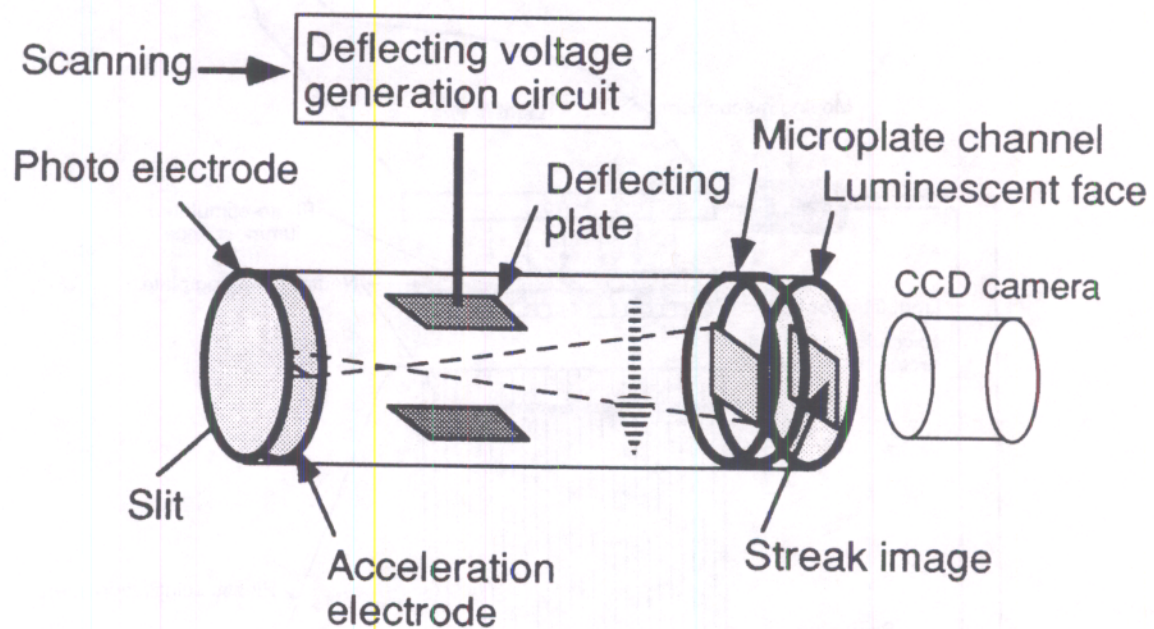
Multi-CCD camera



Compact and simple system



Real time scanning system for spallation neutron sources with a parallel readout method and a streak method



Principle of a streak method

Necessary research and development for realization

1. Full signal readout for one scanning

- 1) Increase of laser power
- 2) improvement of readout method
- 3) New PSL phosphor *with short life time*

2. Prompt luminescence by neutron

- 1) New PSL phosphor with few prompt luminescence
- 2) ~~██████████~~ *Canceling method*

3. ~~██████~~ Sensitivity for gamma-ray

- 1) New PSL phosphor with low density
- 2) Canceling method

Estimated performance for prototype system

1. Small-area-type system

Detection area	: 20cm x 20cm
Position resolution	: 0.2mm
Imaging point	: 1000 x 1000
Readout time/line	: 2 μ s
Scanning speed	: 50m/s
Laser power	: 50W
Readout time for all area (Time resolution)	: 2ms

2. Large-area-type system

Detection area	: 100cm x 100cm
Position resolution	: 1mm
Imaging point	: 1000 x 1000
Readout time/line	: 10 μ s
Scanning speed	: 250m/s
Laser power	: 250W
Readout time for all area (Time resolution)	: 10ms

Conclusion

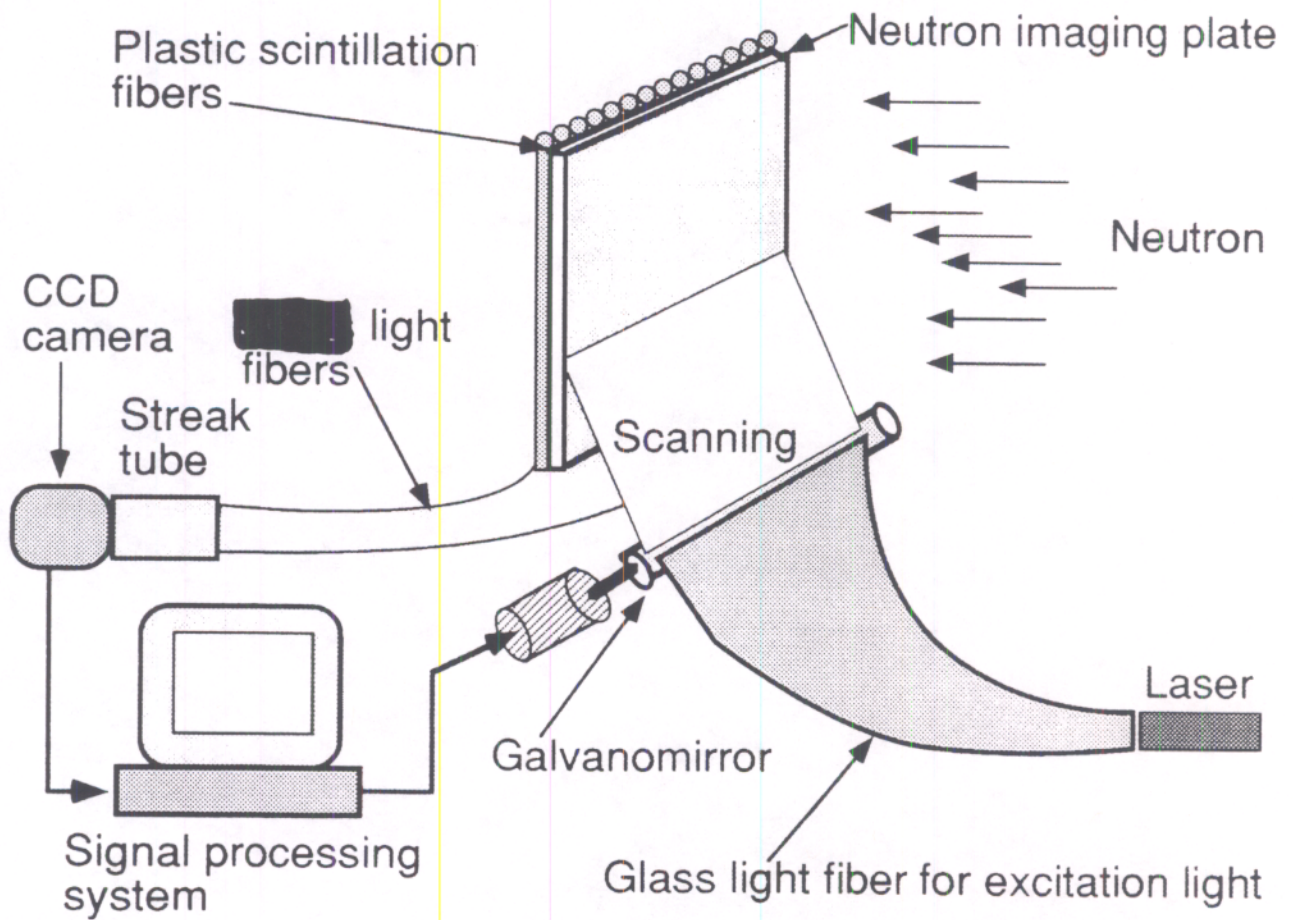


Illustration of real time neutron imaging system using high speed readout method of neutron imaging plate

CONFIDENTIAL

1. The purpose of this document is to provide a comprehensive overview of the project's progress and to identify any potential risks or issues that may arise during the implementation phase.

2. The project has been successfully completed, and the results have been reviewed and approved by the relevant stakeholders.

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